

## The Highland Council

### Transport , Environmental and Community Services Committee 6 February 2014

Agenda Item	<b>9</b>
Report No	<b>TEC 7/14</b>

## Coastal Flood Warning - Moray Firth Tidal Surge Model

### Report by Head of Transport and Infrastructure

#### Summary

This report advises Members of joint working with SEPA to develop coastal flood warning system for the Moray Firth. It provides details of work being undertaken to develop a tidal surge model which will provide more accurate forecasts of critical sea levels at settlements along the coastline. Information on the details, extent and content of this model are contained in **Appendix A**. In addition the report invites Members to approve a contribution of £22k towards the cost of the model development.

## 1. Background

- 1.1 The Council has been working closely with SEPA on the development of coastal flood warning systems for sections of the Highland coastline for a number of years.
- 1.2 Part of the flood warning system is dependent on the utilisation of a predictive tool which will assist in early forecasting of tidal surge and wave height in various critical sectors of the coastline. This predictive tool utilises mathematical modelling techniques based on background tides and predicted tidal surges forecast from weather data including atmospheric pressure, wind strength and direction.
- 1.3 Such models have been in place for the Firth of Clyde for a number of years and at the TECs committee meeting on 17 November Members were advised of a tidal model which had recently been put in place by SEPA for Loch Linnhe and which had proved invaluable during the coastal storms experienced over the Christmas and New Year period.
- 1.4 SEPA have been keen to develop further tidal surge model for the Moray Firth area, an area which has been the subject to storm damage from coastal flooding in recent years.

## 2. Moray Firth Flood Model

- 2.1 Following the severe coastal damage to the eastern seaboard during the winter of 2012 the Council has been in talks with SEPA to assist in the development of a tidal surge model for the Moray Firth area. This model as well as providing

early predictions of tidal surge will also provide predictions of wave height which was a critical factor in the extensive damage to infrastructure and property that winter.

- 2.2 The scoping and extent of this model has been under development over the past year with consideration being given to the data requirements for the model and how this data may be collected to supplement historic weather information. Details of the model and the extent of the coastline to be covered is contained in Appendix A. It should be noted the model covers the coastline from Wick in the north to Peterhead in the east and includes all intermediate settlements. Both Moray Council and Aberdeen shire Council as well as Highland Council will benefit from the model and will be making contributions to the cost of its development.
- 2.3 The model development is currently being procured by SEPA and it is planned to make an award to Hydrological consultants before the end of the financial year. A contribution of £22k is being sought from Highland Council towards the cost of delivering the model and this represents good value for money bearing in mind the high cost of damage and cost of remedial works arising from coastal damage.

### **3. Emergency Services**

- 3.1 The model will allow SEPA to predict wave and surge heights in advance of weather systems and provide this information to the Emergency Services to allow early remedial actions. This will be detailed and specific to each area of the coastline to allow assessment of the impact on communities and property which may prove vulnerable to storm damage. It is important, therefore, to ensure that this model will fit in with the requirements of the Emergency Services as part of an early flood warning system for the Moray Firth and they will be part of the consultation process for model development.

### **4. Implications**

- 4.1 The Council's contribution of £22k towards the development of the model will be allocated from the Flood budget in 2014/15.
- 4.2 There are no legal implications arising from this report
- 4.3 There are no equality implications arising from this report
- 4.4 This model which will more accurately predict tidal surges and will provide a measure of resilience against the effect coastal storms arising from climate change.
- 4.5 There are no risk implications arising from this report.

## **5. Recommendation**

5.1 Members are invited to approve:

- a) Joint working with SEPA on the development of a tidal surge model for the Moray Firth.
- b) A contribution of £22k towards the cost of this model development.

Designation: Head of Transport and Infrastructure

Date: 23 January 2014

Author: S MacNaughton, Head of Transport & Infrastructure

Background Papers: None

# APPENDIX A

## MORAY FIRTH MODEL SCOPING

### 1 Background

- 1.1 SEPA is the flood warning authority for Scotland and under the Flood Risk Management (Scotland) Act has a responsibility for the development and provision of flood warning schemes.
- 1.2 In 2012 SEPA published its Flood Warning Strategy making a number of strategic commitments for improving flood forecasting and warning aiming to reduce the impact of flooding through the provision of reliable and timely flood warnings.
- 1.3 One of the main outcomes under the coastal flooding strategic area is to increase availability of flood warnings to customers and to launch a new flood warning scheme for the Moray Firth. Specifically our scientific aims are to: develop a flood forecasting system that delivers reliable and timely flood warnings; enhance our flood forecasting through better understanding of coastal flooding processes; and improve approaches to wind and wave forecasting in the coastal environment

### 2 Coastal Extent

- 2.1 The Moray Firth (defined as extending from Wick to Peterhead for the purposes of this study) has a history of flooding. This ranges from various ports and harbours to inner Firths and estuaries including the major urban centre of Inverness.

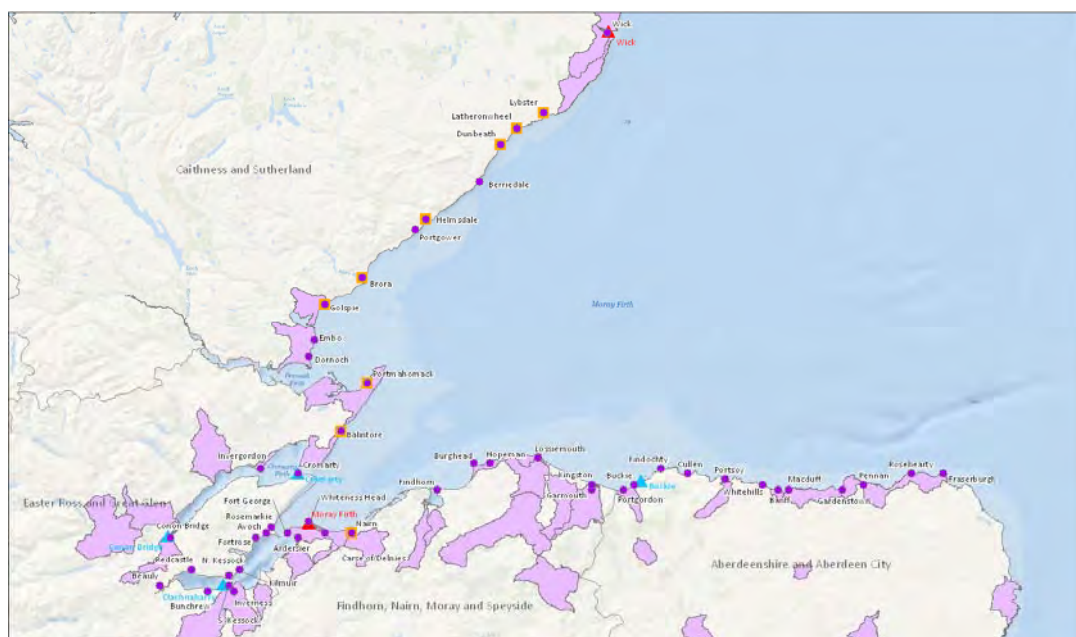
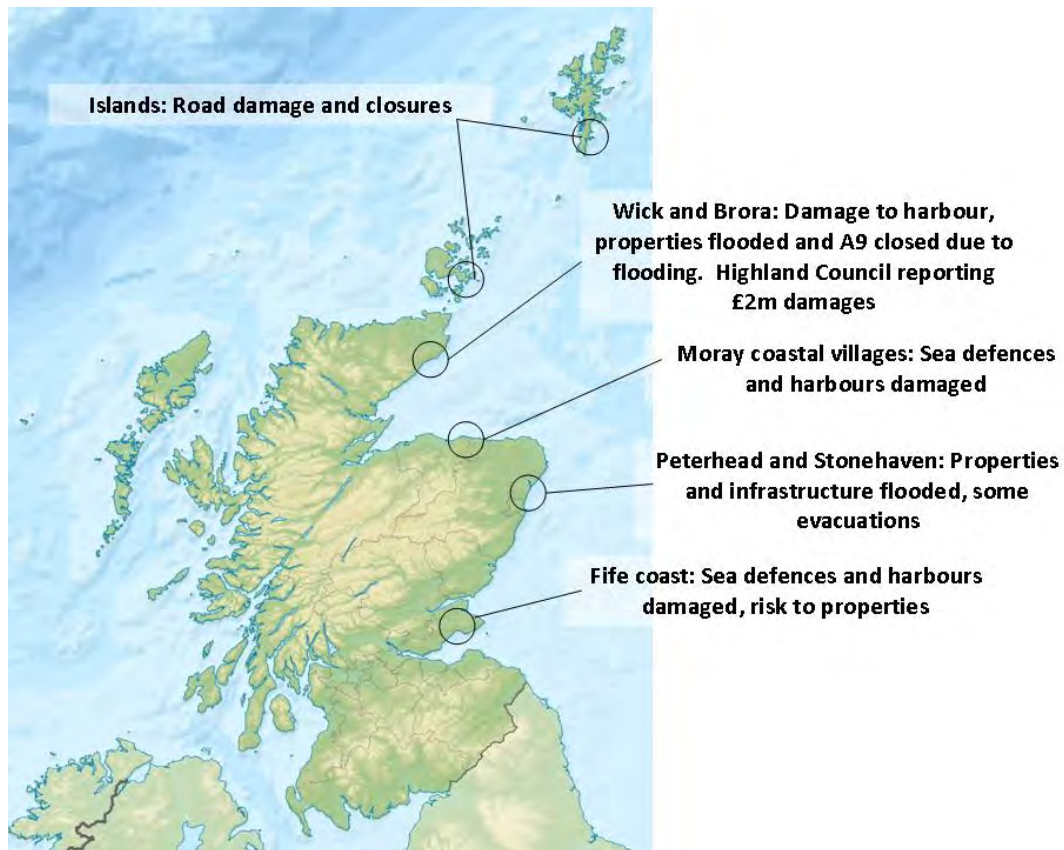


Figure 1: Moray Firth highlighting locations of historical flooding (red) and the potentially vulnerable areas as outlined by [SEPA's flood risk assessment](#).

- 2.2 In December 2012 a storm event caused significant coastal flooding damage to a number communities with some reports estimating the damages to be in the order of £2.5m (source: [Highland Council](#)). Coastal flooding impacts were reported in communities such as Lossiemouth and along various transport links such as the A9 and the Dingwall to Wick rail link.



*Figure 2: The coastal flooding impacts reported in the December 2012 storm*

- 2.3 As part of SEPA's commitment to developing its flood warning capabilities, we intend to use this contract to develop new capabilities for flood prediction and support for flood warning delivery in the Moray Firth.

### **3. Moray Firth flood warning areas:**

#### Aberdeenshire Coast

Fraserburgh to Rosehearty, including:

- Fraserburgh
- Pennan
- Rosehearty

Gardenstown to Whitehills, including:

- Gardenstown
- MacDuff / Banff
- Whitehills

Portsoy to Portgordon, including:

- Portsoy
- Cullen
- Portknockie
- Findochty
- Buckie
- Portgordon

#### Findhorn-Speyside Coast

Garmouth to Burghead, including:

- Garmouth
- Kingston
- Lossiemouth
- Hopeman
- Burghead

Findhorn to Andersier, including:

- Findhorn
- Nairn / Carse of Delnies
- Whiteness Head
- Ardersier / Fort George

#### Inverness Firth

Inverness to Redcastle, including:

- Inverness
- North and South Kessock
- Bunchrew
- Beaully
- Redcastle

Kilmuir to Rosemarkie, including:

- Kilmuir
- Fortrose
- Avoch
- Rosemarkie

#### Cromarty Firth

- Cromarty
- Cromarty Firth
- Invergordon
- Balintore
- Portmahomack

#### East Caithness Coast

Dornoch to Brora, including:

- Dornoch
- Embo
- Golspie
- Brora

Helmsdale to Wick, including:

- Helmsdale
- Dunbeath
- Latheronwheel
- Lybster
- Wick

#### **Additional forecast locations:**

Coastal still water level forecast for tidal (downstream) boundaries of (existing) fluvial models (for later, separate use):

- Spey
- Lossie
- Deveron

SEPA consider this list as provisional. SEPA may consider adding, consolidating or dividing certain target areas if deemed appropriate by the supplier following investigation of the flooding mechanisms. Any amendments will be agreed by the project team during the schematisation phase of the project.